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** CONTINUING DATA **********

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airslide systems

SySRS - ASG1000

System Requirements Specification Document for ASG1000

'Airslide – Better PSTN for your network'

Revision No.: 1.54
Released: 30/1/00
Author: Ofer Gottfried
Document name: SySRS ASG1000

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VERSION HISTORY

Version	Date	Owner	Change History
		Ofer	

Table Of Contents

1. INTRODUCTION

1.1 Scope and Purpose of This Document

This document describes the Technical Specification necessary for the system and software design of the ASG1000™ carrier class product line.

Ref. 1 provides the marketing requirements for this document. The document is the basis to the project design; in some cases other documents provide more detailed description of the system requirements.

1.2 Definitions, Acronyms and Abbreviations

Name	Definition
ASG	Airslide Gateway
MSU	Message Unit
FISU	Fill In Signal Unit
LSSU	Link Status Signal Unit
LI	Length Indicator
SIO	Service information Octet
SIF	Signaling Information Field
PLAN	Private LAN
SNM	Signaling Network Management
SNT	Signaling Network Testing and Maintenance
TFP	Transfer Prohibited
NI	Network Indication Field
SI	Service Information Field

1.3 References and bibliography

Ref. No.	Document Name	Number	Version	Date	Location
1	MRD AS1000.doc				
2	HW Requirements Doc				

2. NETWORK ARCHITECTURE

The full solution of ASG products is as described bellow.

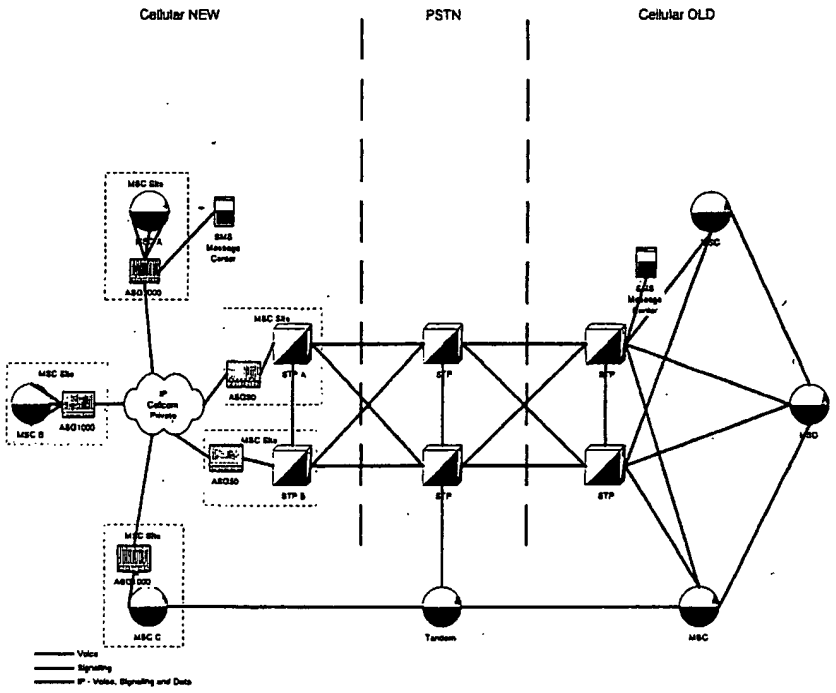


Figure 1: Full ASG Solution

2.1 ASG50 System Architecture

2.1.1 ASG50 System Block Diagram

- Two ASG's will be connected to one MSC for ASG Internal Failure coverage – ASG Set.
- One Active ASG and one Live Standby will be connected at a site for the Signaling and Media Gateway Control handling.
- Each ASG will be connected to the regular MSC SS#7 link sets but in cross whey: Each Link set will have a connection to each one of the two ASG's.

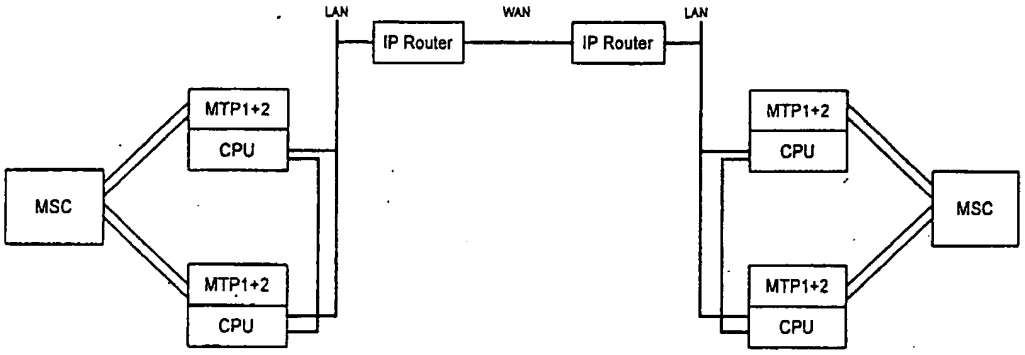


Figure 2: ASG50 System Architecture

- The Active ASG will handle all his incoming/outgoing links form the MSC (MTP 1+2) and the entire site Layer 3 and above messages.
- The Standby ASG will handle all his incoming/outgoing links form the MSC (MTP 1+2) and will transfer on an internal LAN (blue links) all MTP 3 to the Active ASG.
- Only the Active ASG will communicate to other Live ASG's in the network.
- The two ASG's will communicate with each other for fast failure detection.
- There will be no difference between the active ASG and the standby ASG in terms of configuration, cabling, etc.
-

2.2 ASG1000 System Architecture

2.2.1 ASG1000 System Block Diagram

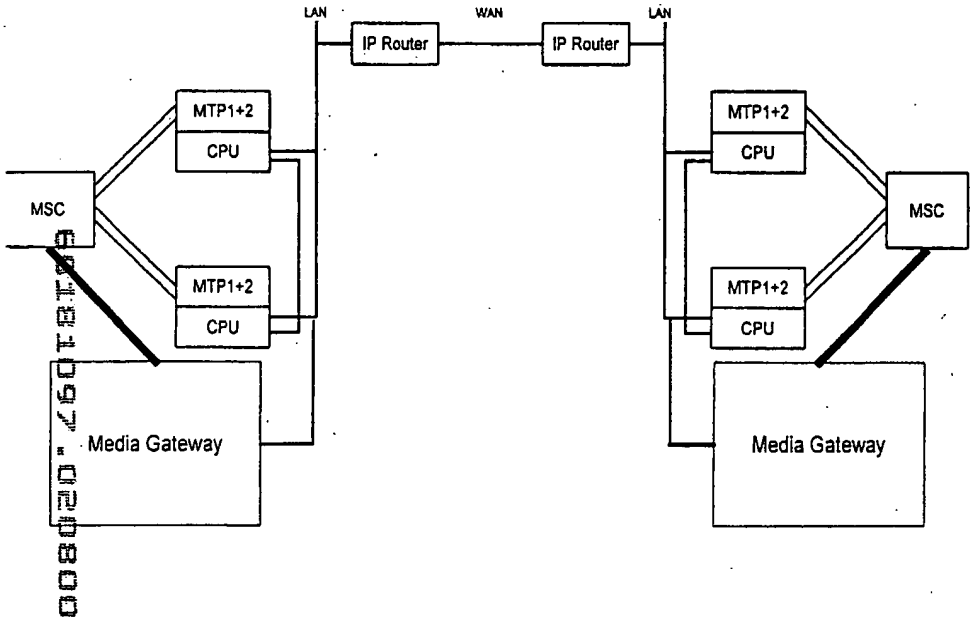
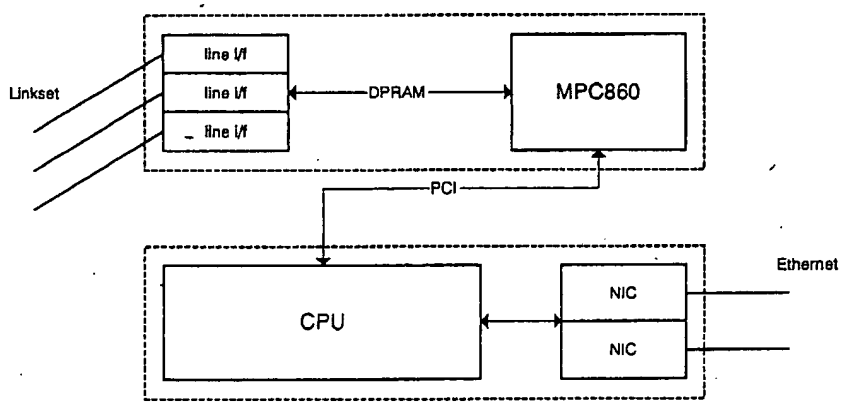


Figure 3: ASG1000 System Architecture

2.3 ASG's H/W Platform

2.3.1 HW Block diagram

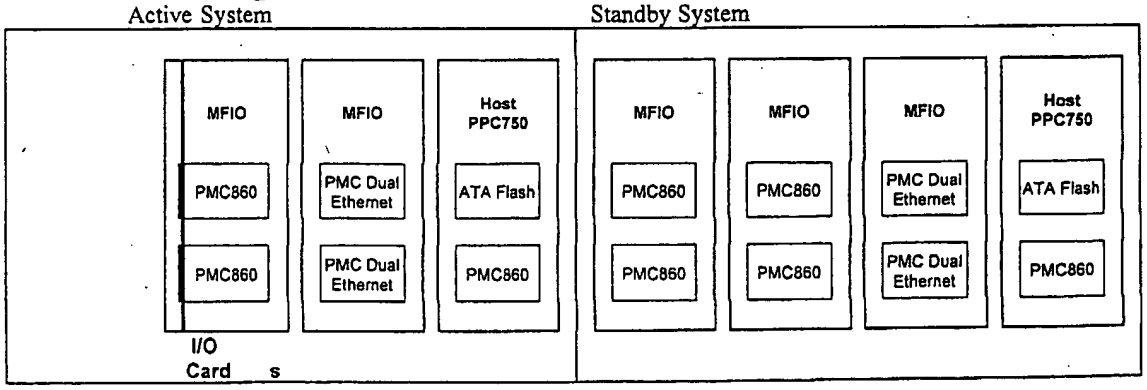
ASG is a cPCI-based product.
Each cPCI chassis holds two sets of line I/F card and Host CPU. Both the line I/F and the CPU boards are standard components.



-Figure 4: One ASG HW Block Diagram

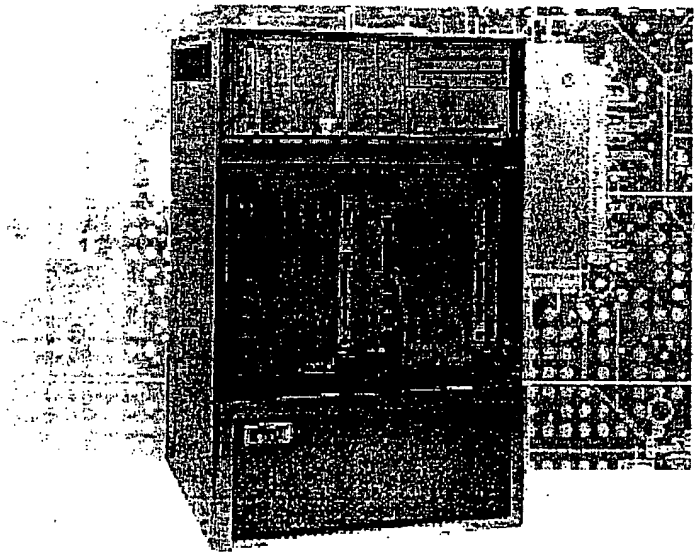
2.3.2 ASG System Cards

See Air1/air_doc/hardware/force/... for details



2.3.3 Chassis

cPCI Telco platform



Fore more HW requirements see HW Requirements doc Ref #3.

2.3.4 General

- Telecom Alarm relay Panel
- Redundant powĕr supply.
- 48V power supply option

3. REQUIREMENTS AND FEATURES

3.1 Supported Network I/f

3.1.1 PSTN I/F

- E1/T1 75-120Ohm from 2 to 10 in a system. G703, G.704
- V.35 for other SCP connection? Not in first phase.
- DACS functionality for channelized SS#7 TS – LOW
- For large STPs we will use few ASGs.

3.1.2 IP Network I/F

Every ASG board should support four NICs. The first NIC will be connected to the corporate LAN. All the signaling communication to other site will be done through this port.
Management features will be done also from the corporate LAN. Via SNMP
The second NIC will be used for a point-to-point connection to the other ASG board. Different Statistics and reports should be available trough the management system
This link will be use ONLY for Active/Standby communication between the two.
For each NIC a NIC Redundant will be available. Do we need a hub / switch here for full redundant operation between the NICs?

- IEEE 802.3 10/100BaseT
- Support of all needed protocols (DHCP, RIP, ICMP, ROUTING etc.) and MIBs
- QoS protocols – Diffserv RSVP or other future protocols act…

3.1.3 Clock Synchronization *T.N2030*

- Recovered from incoming Trunks
- Internal clock
- Clock recovery mechanism for choosing Internal clock when the incoming signal is lost and returning back to Recovered when it alive.

3.2 Basic Traffic Features Active ASG

3.2.1 MTP Layer 1+2 Termination T.N1010

- According to Q.700 Series and Bellcore – Close purchased S/W on the PMC for all MTP1 and 2 terminations.
- Handles FISU and LSSU messages (detected according to LI fielding in the MSU)
- Both ANSI and ETSI flavors will be supported according to configuration.

3.2.2 MTP Layer 3 Message Handling T.N1020

3.2.2.1 Layer 3 message Routing

3.2.2.1.1 Message Discrimination from MSC

- After receiving a valid message from the PMC or the Standby system:
- >From the SIF field in the MSU, the first 14 (CCITT) or 24 (ANSI) bits are the DPC of this message.
- According to a DPC and NI fields a match will be searched on the ASG IP to DPC table. According to the result the system will build a message (according to the IP protocol) and will sent it. This is like an STP Link Set Routing Function available to the entire network.

This procedure should take no more then 20Msec in (from MSC) and out (to the IP).

3.2.2.1.2 Message Discrimination from IP:

On receiving message from the IP it will be sent to the MSC on the relevant Link set according to the local Link Set Routing and Management.

- This should take no more then 10Msec.

Remarks:

- ASG's could be with few DPCs behind him!!
- No MTP type detection in ASG50

3.2.2.2 Gateway Screening

- For Front/End STP Functionality ***IF NEEDED***.

3.2.3 MTP 3 Network Management T.N1030

All MTP3 "Traffic Management, Link Management, Routing Management and Congestion (Flow) Control" should be utilized according to the standard (page 46 ADC book). The ASG should use a purchased MTP 3 layer of an STP and utilize all his Management options. One of the Link sets of this MTP 3 will be change to the IP port.

Message Priority on the SS7 need to be handled!! 4 Priorities and 3 flow control message discard – Maintenance messages are high level

3.2.3.1 Incoming Signaling Traffic Link Route

- For balancing between the Active and Standby Links and between the link set themselves a Decision mechanism that selects the SS#7 link to handle the incoming message is needed (regular load balancing)

- The above is affected also from the Link Status and Fault Condition Handling table.

3.2.3.2 Outgoing Signaling Traffic Link Route

- For balancing between the few ASG that are connected to a big STP, a mechanism to load shearing is required.

3.2.3.3 Signaling Link Management

Controls the alignment of a link set (page 22 of big book)

3.2.4 OMAP Signaling SNM SNT Maintenance Handling

T.N1040

- What happens to all those messages while the links are not connected to STP, do we need to terminate them or it will be O.K (page 54 at Ericsson) CHECK!!!!!!
For example CVT: Circuit validation Test and MRVT Message Routing Verification Test (TCAP, ASEs and OMAP white book P-64)- dose it End To End or not ??
  - It looks that the ASE MRVT will be done from MSC to ASG and the ASG's protocol will be the extension of this operation (on the network) like the STP, OR if it possible that the MSC will make the test directly to the far MSC
  - CVT are MSC to MSC, Includes CICs to be tested, synchronization of CICs between MSCs we need to ***interfere*** in this message to change the CICs to be virtually synchronized between the MSC's!!

Check SNM SNT what do they do????????????

3.2.5 Global title translation T.N1050

3.2.5.1 ASG50 will forward global title translation query to a real STP (High)

3.2.5.2 Or, For reducing the traffic to the STP - ASG50 will handle the query from it's own database (Low)

3.2.6 Protocol between ASG's (WAN) T.N1060

The ISUP/IP Protocol should be Standard Draft that Cisco will push.

All MTP3 "Traffic Management, Link Management, Routing Management and Congestion (Flow) Control" should be utilized for the IP protocol according to the standard (page 46 ADC book).
Message Priority on the SS7 need to be handled!! 4 Priorities and 3 flow control message discard – Maintenance messages are high level

3.2.6.1 MTP2 functionality over IP

- Dealing with Physical Link and Collision rate, Packet Loss ?

3.2.6.2 Message Handling

ISUP over IP format
SCCP and TCAP over IP Format

3.2.6.3 Network Management

- Dealing with routing sites, MSC connections and availability distribution to all other ASG's (Transfer Prohibited for specific site).

3.3 Additional Traffic features (ASG1000)

3.3.1 Call control T.N8010

Context Support for call control of each configured CIC

3.3.2 ISUP monitoring T.N8020

Only ISUP/IAM messages that are IN the network will be handled for call control- If the MSC is also connected directly to the PSTN (without MG) those call setups will ***not*** be handled for call control. Those messages will be only routed to the STP or relevant ASG for signaling routing.

3.3.3 IS41/MAP monitoring *T.N8030*

For CDMA Networks Handoff calls are handled in the IS41/MAP protocol like ISUP IAM act.

3.3.4 Port selection (map CIC to IP, Port) *T.N8040*

For opening the call between the MG's we need to synchronize the IP,PORT and CIC between the near and remote ASG and MG's.

3.3.5 CIC manipulation *T.N8050*

Because we change the network topology, the MSC's has virtual connection between all the MSC's without dependencies to the CIC.
There is a need to interfere in the ISUP and maintenance messages to change the CIC number in the originating side and the terminating side.

3.3.6 Media gateway control *T.N8060*

The call module is the module that is responsible for getting all the 'CIC associated' messages like ISUP and HANDS-OFF in IS41. this object will keep track on the state machine of each call. The call object should NOT interfere with the messages types in order not to mess with the state-machines that the MSCs maintain. The only field that can by touched is the DPC and the CIC.
The call object should control the media gateway according to the states of the specific call.

3.3.6.1 MEGACO

Call control for the MG. With maintenance and general control functions.

3.4 Traffic Features StandBy ASG

3.4.1 MTP Layer 1+2 Termination *T.N2010*

- According to Q.700 Series and Bellcore – Close purchased S/W on the PMC for all MTP1 and 2 terminations.
- Handles FISU and LSSU messages (detected according to LI fielding in the MSU)

3.4.2 MTP Layer 2 to 3 Tunneling *T.N2020*

3.4.2.1 Layer 3 message Routing

- All Layer 3 Messages will be routed to the Active ASG50 through the private LAN. The Active ASG50 will manage all the Management of the MTP3.

3.5 System Performance

- ASG50 will be abele handle up to 120% of the Signaling traffic incoming and outgoing from one full MSC (including traffic, data quires and maintenance).

3.5.1 MTP Transfer Time *T.N2040*

Throughput: Large STP dose 200000Transuctio/Sec, and 27000 entries, It has 4000 route sets.

Latency, Load, Messages, throughput message per second

3.5.2 Call setup time

In the PSTN regular TCAP query (1-800) call setup takes 250-350Msec (till ring back). It gives the TCAP message a 150Msec round trip. Even though the standard gives more time (IETF) specify 1.5sec !!!
Need to check the timing in the Cellular !!!- Vladi Check

Less then 100Msec with voice opened.

3.5.3 BHCA

Need to be able to make 120% of a large MSC there is -

3.5.4 Number of SS7 timeslots (DS0)

Each timeslot supports a maximum number of 30 call/sec (100% capacity).
DS0 should never support more than 80% capacity -> 24call/sec
Assume 4000 simultaneous calls on each MSC.
Assume 80 sec call length
So, 4000/80 = 50 call/sec (50*60*60=180,000 BHCA)
50 call/sec requires three DS0 in one link
Note that each link set is at least two links that are load sharing each other. Most of the time, each DS0 makes only 40% of it's capacity.

Each signaling link should support between 1 to 3 timeslots.
And should be scalable to 6, in case SMS will take 50% of system traffic (in the future)

According to TEKELEC:

Each 11000 users require 1 Link for SSP
Every 31 queries/sec to SCP require 1 Link (at 0.4 Erlang and 90 octet queries)

3.5.4.1 Transaction Per Second

3.5.4.2 Messages Latency

3.6 Fault Condition Handling T.N3010

3.6.1 IP Network Side

3.6.1.1 IP Network Connection

3.6.1.2 Remote Nodes Failure

3.6.1.3 Consecutive Actions

3.6.1.4 Crash of SSP

- Distribute Multi unicast Messages to inform all networks.
- Other Maintenance support

3.6.2 PSTN Network Side

3.6.2.1 Layer 1 Failures

3.6.2.2 Layer 2 Failures

3.6.2.3 Consecutive Actions

3.6.3 Terminal Internal Failure

3.6.3.1 Consecutive Actions

3.6.4 Alarm Handling Priority & Display

3.7 Availability & Reliability

To achieve 99.999% working time and Carrier Class system an Active ASG with Live Standby ASG architecture was selected (see 2.1). For this purpose a Private LAN will be used to communicate between the Active and Standby systems. Through this connection the two systems will communicate with each other for Fault detection, Load balancing and Application Synchronization.

Reliability, Availability and Serviceability features of the ASG series should include the following:

- Online software reconfiguration-Enables software configuration changes to occur without rebooting or interrupting network applications and services.
- Online insertion and removal (OIR)-Allows seamless upgrades to higher density and new interface cards without rebooting or taking the system off-line. OIR will reduce operator intervention because the interface cards should automatically be reconfigured.
- Fast boot-Enables the system to come online quickly (30 seconds should be typical) after software upgrades, minimizing impact on the network.
- Environmental monitoring-Alerts you to fluctuations before critical conditions occur, allowing proactive resolution while the system stays online.
- Self-diagnostics and tools (Init Built In Test)-Ensures that modules are operational before going online, eliminating potential network problems.
- Optional dual-redundant power supplies systems -Extend individual power supplies by load sharing.
- Flash memory-Enables fast, reliable software and microcode updates. Allows a single, centralized point of administration, eliminating the need to visit each ASG site when updating software or microcode.

3.7.1 Protocol between ASG's (PLAN) *T.N3030*

Only one NIC is alive!! But knows all NICs of each site. When Standby awakes send multi unicast to the entire network to change Add. Trans

3.7.1.1 General

During initialization and every 1Sec each system will check the communication with each other …
K.A. – With the full state machine.

3.7.1.2 MTP3 over IP

3.7.1.3 Application Synchronization

Call Control
Layer 3 Management Synchronization
Ongoing calls not affected!!!

3.7.2 Switch time of XXX sec *T.N3040*

3.7.2.1 Standby ASG Detection

The Standby ASG detects Fault at the Live

3.7.2.2 Active ASG Detection

The ACTIVE ASG detects Fault at the Standby

3.8 Maintainability & Testability

Maintenance of the system (operation mode up/down/ maintenance) SS7 maintenance

3.8.1 B.I.T *T.N4010*

3.8.2 Maintainability *T.N4030*

- PSTN Interface Loop Back
- Internal Modem for remote support

3.9 Management

3.9.1 Status Monitor *T.N5010*

3.9.1.1 Network Connection Level

3.9.1.2 Equipment Level

3.9.2 Configuration Editor *T.N5020*

Tables on the system:

- OPC to IP
- Global title translation table

For each table the following should be decided

- Method of update – management tool
- Static and dynamic update

All configuration parameters should be available to changes in Run Time. For example it should be available to add/extract I/O cards in Run Time!!

3.9.3 Remote S/W Update T.N5030

Non-Traffic affecting

3.9.4 Statistics Reports T.N5040

- Statistical tool for collecting data on calls, roaming, SMS and others for provisioning

3.9.5 Standard MIB T.N5050

SS#7 MIB for all Layers
DS1 MIB

3.9.6 Traps T.N5060

3.10 Security T.N5070

The backbone is shared with the GPRS/CDPD users, therefore the system should not response to any terminal that is not authorized

3.11 QoS T.N6010

Packets between ASGs should be prioritize as following

1. Voice packets
2. Signaling packets
3. Data packets

The prioritization tagging should be according to the standard the routers support? (What is that standard) (Who is supporting it?) (Depends on our partners because the tagging can be proprietary)

3.12 Backward compatibility T.N6040

3.12.1 To SW & Configuration

3.12.2 To IP Protocol

3.12.3 To Internal Stand by Protocol

3.13 Licensing T.N6060

3.13.1 Per port ?

3.13.2 Per max ongoing calls

3.14 Compliance requirement T.N6080

3.14.1 NEBS

The HW Platform should be tested and certified for he selected Platform and cards!!

3.14.2 CE

3.14.3 ETSI

Front and Rear cable connection will be available BUT the depth of the Chassis will

3.14.4 Standard Compliance

3.14.4.1 SS#7

3.14.4.2 ANSI

Bellcore GR-246-CORE:

- T1.111.1 Functional Description of the MTP

- T1.111.2 Signaling Data Link
- T1.111.3 Signaling Link
- T1.111.4 Signaling Network Functions and Messages
- T1.111.5 Signaling Network Structure
- T1.111.6 MTP Signaling Performance

STP Generic Requirements GR-82-CORE

3.14.4.3 ITU-T

CCITT white book Q.700 Series

- Q.701 Functional Description of the MTP
- Q.702 Signaling Data Link
- Q.703 Signaling Link
- Q.704 SS#7 Network Functions and Messages
- Q.705 Signaling Network Structure
- Q.706 MTP Signaling Performance
- Q.711 SCCP Functional Description
- Q.712 Definition & Function of SCCP Messages
- Q.713, 714, 716, SCCP Format, Procedures and Performance
- Q.728 MTP2 Test Specification

3.14.4.4 Country Flavors

To Be Added

3.14.4.5 Continuity check?? Need to support or not?

3.14.5 ENVIRONMENTAL Specifications

Operating Temperature:	0 to 55 Degrees C
Storage Temperature:	-40 to 85 degrees C
Operating Humidity:	20% to 80% relative humidity
Storage Humidity:	10% to 95% non-condensing
MTBF:	100,000 hours

3.15 Monitoring capabilities (TTI like) T.N7010

A joint venture with TTI might add valuable edge to this product.

3.16 Added value services T.N7020

3.16.1 SMS services

- Airslide will provide (free of charge?) a DLL for Windows (or other OS). Using this DLL, new WAP and/or SMS services can be easily develop without the need to understand SS7 complexity.
- The DLL will execute all lower level of SS7 protocol (NIC/MTP3/SCCP/IS41/SMS)
- ASG's will need to terminate/reroute SMS messages directly to the SME Server (Small Medium Enterprise).
- PC to phone (using the DLL)
- Voice mail application without E1 cards and SS7 terminating links (DLL)

3.16.2 Hardcore IN developer (i.e. HLR, WIN, Voicemail)

Provide a driver that will be placed, transparently, in OMNI/Compaq/Trillium stack, and enables them to work without a real SS7 H/w.

4. OPEN ITEMS AND NOTES

- ***Use only private LANs for all OMNI network traffic.*** For the private LANs, use the 192.168.0.0 C class network addresses which are reserved for private LANs by Internet Engineering Task Force (IETF). Use the *third* octet to identify the LAN, and the *fourth* octet to identify the CE. ***Use the same network address scheme for all OMNI clusters.*** The same private addresses for private LANs can be used by different OMNI clusters, even if all the clusters are attached to the same corporate network.
- How many MSCs exists in a standard network (from 6 to 20?)
- What is the physical connection in a given network (E1, SDH etc.)?
- What will be better to the operator (in terms of configuration change): two link sets with one E1 for each link set or one link set with two E1s. It seems that one link set will be easier to support because of SCCP, connection oriented, messages that should travel on the same link sets for all messages in one transaction.
- The ASG50 will need to support ANSI for ISUP & ETSI for TCAP (only in Israel?). ISUP is only inside the network (cellcom).

APPENDIX A

5. CALL FLOW SCENARIOS

T.N9010

5.1 Signaling only

5.1.1 Mobile to mobile

- Originating MSC query the STP for the location of the terminating mobile unit's MSC.

5.1.2 Mobile to land

5.1.3 Land to mobile

5.1.4 Hand-off

5.1.5 SMS

5.1.6 GPRS/CDPD flow

5.2 Signaling and Traffic

5.2.1 Mobile to mobile

- Originating MSC query the STP for the location of the terminating mobile unit's MSC.

5.2.2 Mobile to land

5.2.3 Land to mobile

5.2.4 Hand-off

5.2.5 SMS

5.2.6 GPRS/CDPD flow

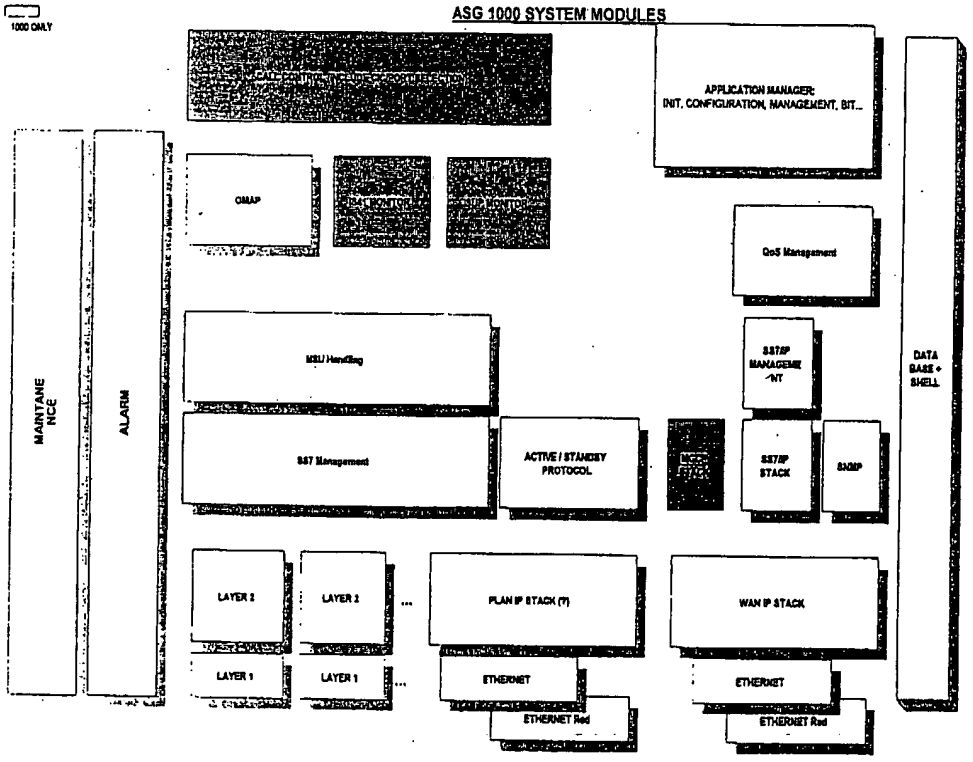
APPENDIX B

Tasks Priority Table:

Task No.	Task Name	Phase I Priority	Phase II Priority
	Requirements and features		
	Traffic Features Active ASG50n		
1010	MTP Layer 1+2 Termination *T.N1010*	1	1
1020	MTP Layer 3 Message Handling *T.N1020*	1	1
1030	MTP 3 Network Management *T.N1030*	1	1
1040	OMAP Signaling SNM SNT Maintenance Handling *T.N1040*	2	1
1050	Global title translation T.N1050	3	3
1060	Protocol between ASG's (WAN) *T.N1060*	2	1
	Traffic Features StandBy ASG50n		
2010	MTP Layer 1+2 Termination *T.N2010*	2	1
2020	MTP Layer 3 Routing *T.N2020*	2	1
	Supported Network I/f		
	PSTN I/F		
	IP Network I/F		
2030	Clock Synchronization *T.N2030*	2	1
	System Performance		
2040	MTP Transfer Time *T.N2040*	1	1
	Call setup time		
	BHCA		
	Number of SS7 timeslots (DS0)		
3010	**Fault Condition Handling T.N3010**	2	1
	IP Network Side		
	PSTN Network Side		
	Terminal Internal Failure		
	Alarm Handling Priority & Display		
	Availability		
3030	Protocol between ASG's (PLAN) *T.N3030*	2	1
3040	Switch time of XXX sec *T.N3040*	2	1
	Maintainability & Testability		
4010	B.I.T *T.N4010*	3	2
4020	Reliability (switch time) *T.N4020*	3	2
4030	Maintainability *T.N4030*	3	2
	Management		
5010	Status Monitor *T.N5010*	2	1
5020	Configuration Editor *T.N5020*	2	1
5030	Remote S/W Update *T.N5030*	2	1
5040	Statistics Reports *T.N5040*	2	1
5050	Standard MIB *T.N5050*	2	1

5060	Traps *T.N5060*	2	1
5070	**Security T.N5070**	3	2
6010	**QoS T.N6010**	3	1
6040	**Backward compatibility T.N6040**	2	1
	To SW & Configuration		
	To IP Protocol		
	To Internal Stand by Protocol		
6060	**Licensing T.N6060**	4	3
	Per port?		
	Per max ongoing calls		
6080	**Compliance requirement T.N6080**	3	2
	NEBS		
	CE		
	ETSI		
	Standard Compliance		
	Environmental Specifications		
7010	**Monitoring capabilities (TTI like) T.N7010**	4	2
7020	**Added value services T.N7020**	4	3
	SMS services		
	Hardcore IN developer (i.e. HLR, WIN, Voicemail)		
	Addition features for ASG1000		1
8010	Context support for call control *T.N8010*		1
8020	ISUP monitoring *T.N8020*		1
8030	IS41/MAP monitoring *T.N8030*		1
8040	Port selection (map CIC to IP, Port) *T.N8040*		1
8050	CIC manipulation *T.N8050*		1
8060	Media gateway control *T.N8060*		1
9010	**Call flow scenarios** *T.N9010*		
	Signaling only	1	
	Mobile to mobile	1	
	Mobile to land	1	
	Land to mobile	1	
	Hand-off	1	
	SMS	2	
	GPRS/CDPD flow	2	
	Signaling and Traffic		1
	Mobile to mobile		1
	Mobile to land		1
	Land to mobile		1
	Hand-off		1
	SMS		1
	GPRS/CDPD flow		2

APPENDIX C



airslide systems

MRD - ASG1000

Marketing requirement document for ASG1000

'Airslide – Better PSTN for your network'

Revision No.: 1.86
Released:30/1/00
Author: Oren
Document name: MRD ASG1000

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VERSION HISTORY

Version	Date	Owner	Change History
		Ofer	

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1. INTRODUCTION

Airslide addresses a new, emerging market space -- full featured, PSTN-grade telephony systems over multi-service IP networks. Airslide Gateway allows customers to take advantage of the cost efficiency, open standards, and time to market for innovative new services promised by IP networks without sacrificing the values of traditional telephony: service richness, quality, reliability, scalability and manageability. Providing PSTN equivalency is the first step towards moving to highly advance integrated voice/signaling/data communications, based on an IP network.

Airslide Gateway:

- Provides unsurpassed carrier reliability and scalability
- Provides PSTN equivalent telephony services with no customer behavior changes
- Allows rapid time-to-market by de-coupling services from transport
- Seamlessly inter-operates with existing circuit-switched networks using native SS7 signaling
- Acts as a foundation infrastructure for next generation advanced voice, data, and multimedia services
- Lowers infrastructure costs, taking advantage of open architecture, general computing platforms and silicon economics
- Lowers operational costs taking advantage of a single network for voice and data, integrated management and fewer required operator skill sets
- Allows dynamic scalability from limited MSC connections to full-scale MSC coverage

Airslide Gateway enables cellular providers to protect their investment in existing network equipment, while benefiting from the low cost of a converged IP network.

1.1 Scope and Purpose of This Document

This document defines the marketing requirements of the ASG1000™ carrier class product line. The target cost, time-to-market road map, and the functional requirements for the ASG1000™ product line are defined.

This document should be used as the basis for designing the ASG1000™ carrier class product line.

1.2 Definitions, Acronyms and Abbreviations

<This subsection should provide the definitions of all terms, acronyms, and abbreviations required to properly interpret the SRS..>

Name	Definition

1.3 References and bibliography

Ref. No.	Document Name	Number	Version	Date	Location

2. GLOBAL DESCRIPTION

2.1 The problem

In order to properly demonstrate the Airslide solution, we have selected two separate cellular networks as a case study; Cellcom (TDMA) and Partner (GSM).

Airslide Gateway (ASG1000™) allows physically separate Signaling, Data and Voice Networks to converge. while maintaining their private network.

Cellular private networks comprise three main aspects - voice trunks, signaling trunks and data trunks. Each of those are usually connected separately.
When a user hits the send button on the Cellcom network, the MSC sends a signaling message (over the blue lines) to the target MSC. When the call is established, voice is traveling from the originating MSC to the terminating MSC (over the red lines). Some times there is no direct connection between the two and a tandem switch is used.

A tandem is a circuit switch, which enables a connection between two switches, which are not physically connected.

This is the case when a call from Cellcom's 'MSC A' is originating a call to Partner's 'MSC A'. In such a case, Bezeq's tandem switch is used. Moreover, within the cellular network when 'MSC A' is originating a call to 'MSC C', 'MSC B' acts as a tandem.

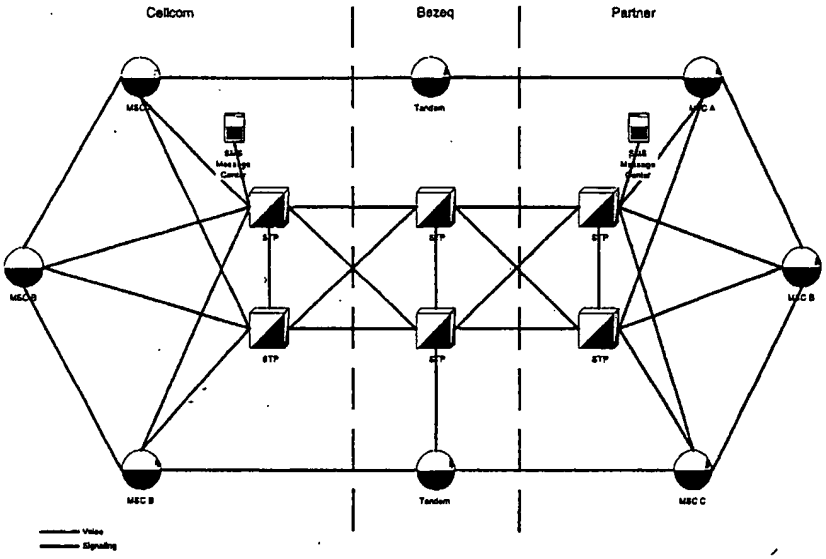

Figure 1 : Two cellular networks and one PSTN in between –situation today

2.2 Airslide solution between two networks

The first step in using the Airslide solution between Cellcom's 'MSC A' and Partner's 'MSC A' is to install one ASG1000™ on each MSC site on either side. The inputs to the ASG1000™ on both sides will be the voice trunks (red lines), the signaling trunks (blue lines) and the data trunks (also blue line). Note that the ASG1000™ connects directly to the MSC in the same room (POP), therefore no transport costs involved.
The output from the system is an IP link (over SDH), which will be connected to the other Gateway over leased line or RF.

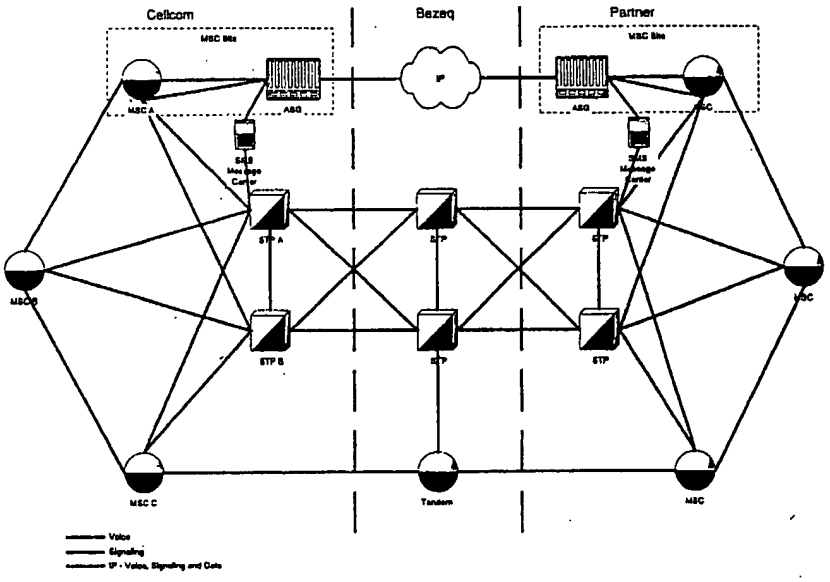

Figure 2: Connecting one MSC on one network to one MSC on the other network. Signaling, voice and data are now traveling between networks on one IP link This solution saves money for both operators

When Cellcom's 'MSC A' originates a call, the signaling goes from the MSC, into the ASG1000™ (instead of to the 'STP A'), the ASG1000™ transmits the signaling to the other ASG1000™ on the other side, which then transmits the signaling to Partner's 'MSC A'.
Both MSCs are not aware of this efficient IP transmission because ASG1000™ simulates the standard signaling link (the small blue line between the MSCs and the ASG1000™).
Note that the signaling (blue) network is not in use for the traffic that goes between the two sites. All Signaling, Voice and Data is traveling on the same IP link.
When the call has been established, both MSCs start sending the PCM voice on one of the timeslots of the red link. ASG1000™ is now compressing and packetizing the voice and transmits the data to one anther on the IP link.
Here also, both MSCs are not aware of this sending mechanism because the ASG1000™ simulates a standard PCM/E1 link to them.
Roaming signaling between the two networks is been treated as standard SS7 signaling and will travel conveniently between the two on the same IP link. Thus enabling roaming between the two networks without using the PSTN's equipment. (The blue network lines)
Any data that should travel between those sites could be aggregated to the same link.

The IP link in this case can be up to 10 times smaller and still carry the same traffic load.

2.3 Airslide solution inside the network

The next step is to install ASG1000™ in the 'MSC B' site, within the larger scope of the cellular network. Now three Airslide MSCs are connected and form an IP Network. (figure 2).

All signaling, voice and data traffic between 'MSC A' and 'MSC B' is now converged to the same IP link. Every cellular call that goes between 'MSC A' and 'MSC B' is now optimized, and travels on the same IP link.

ASG1000™ optimizes the connections inside the cellular network as well as between two cellular networks. Now, any voice, signaling and data traffic between Cellcom's 'MSC B' and Partner's 'MSC A' is end-to-end IP. Both ASG1000™ Gateways are translating the voice, signaling and data to IP and back without the participation of ASG1000™ and the MSC that is located on the Cellcom's 'MSC A' site. In essence, we're dropping unnecessary tandems.

The conversion is done once, and travels on IP through Cellcom's 'MSC A' site. This topology saves MSC resources (voice switching and signaling care) that were used for that type of call before ASG1000™ was installed.
The MSC is also optimized and will be less loaded for the same amount of traffic, thus enabling the provider to add more subscribers without adding equipment to the MSCs.
This topology also saves two signaling links between the MSC to the STP.
Roaming signaling inside the network is being treated as regular signaling and conveniently, also travels on the IP network.

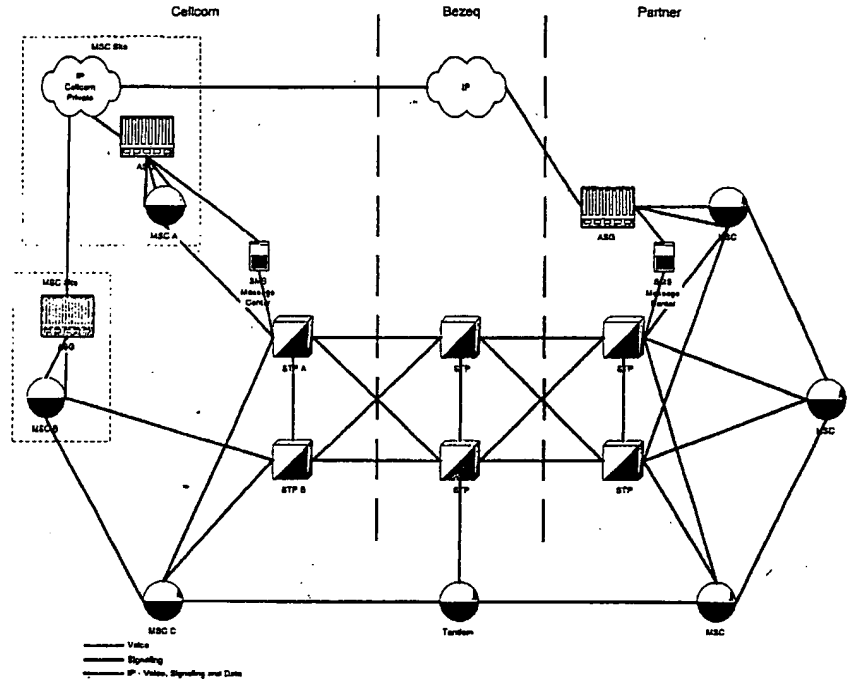

Figure 3: Adding another ASG1000™ to Cellcom's 'MSC B'.
Signaling, voice and data are now traveling inside the same network as well as between different networks on one IP link
This solution saves more money for Cellcom

2.4 Full Airslide solution

Another ASG1000™ was installed on Cellcom's 'MSC C' site.
Also, two ASG50™ (a signaling only gateway without voice) were installed in front of the two STPs.
Any call/roaming/data in Cellcom's network is now fully optimized and travels on an IP network transparently.
Any call/roaming/data from Partner's 'MSC A' to anywhere in the Cellcom's network is now fully optimized and travels on an IP network transparently.

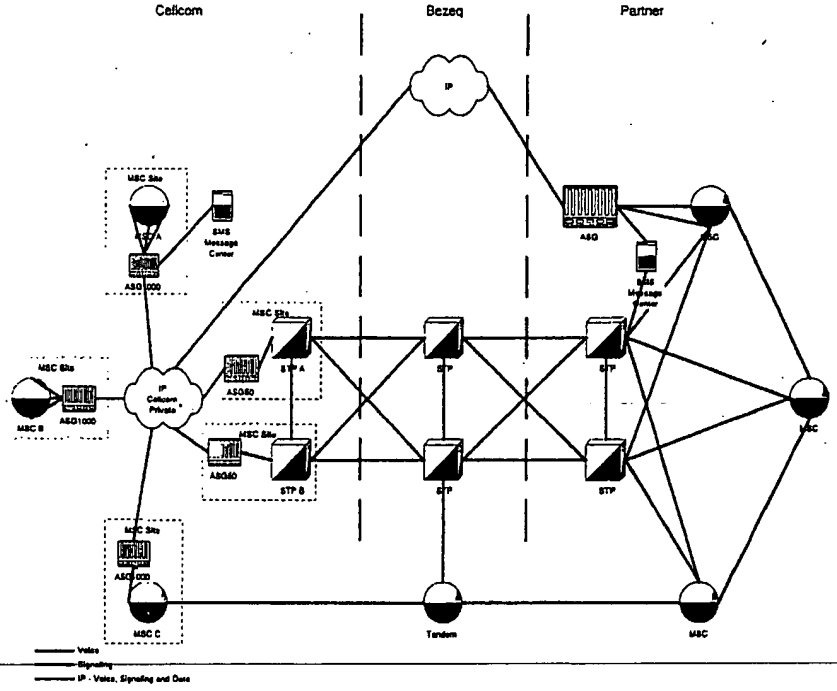

Figure 4: Cellcom's network is now fully populated with Airslide's equipment
Signaling, voice and data are now traveling inside the same network as well as between different networks on one IP link

3. MARKETING STRATEGY

3.1 Direct sales

3.1.1 Service provider

3.1.2 Clearing house (umbrella)

3.2 OEM deal

4. ARCHITECTURE

4.1 System diagram

(ADD From the White Paper – Oren)

4.1.1 Current network architecture figure from white paper

4.1.2 Airslide network figure

4.1.3 Call flow scenarios (signaling + voice flow)

4.1.3.1 Mobile to mobile

- Originating MSC query the STP for the location of the terminating mobile unit's MSC.

4.1.3.2 Mobile to land

4.1.3.3 Land to mobile

4.1.3.4 Hand-off

4.1.3.5 SMS

4.1.3.6 GPRS/CDPD flow

- Traffic load calculation
- Two MSCs – RF and landline
- Zoom on one MSC site with all boxes
-

5. OBJECTIVES OF THE ASG1000™ PRODUCT FAMILY

5.1 Goals of the ASG1000™ Product Family

5.2 Cost target

5.3 Objectives

5.3.1 Strategic Objectives

5.3.2 Tactical Objectives

5.3.3 Supported standards

5.3.4 Objectives Regarding Interworking and Standards Compliance

5.3.5 Tradeoffs and Priorities

5.3.6 Non-Objectives

6. REQUIREMENTS AND FEATURES

6.1 Cost

6.1.1 Basic cost per port

6.1.1.1 Cost breakdown

6.1.2 Other components' cost

6.1.3 Total cost calculation

6.2 Traffic Features ASG50™

6.2.1 MTP Layer 2 Termination

6.2.1.1 According to Q.700 Series and Bellcore

6.2.2 MTP Layer 3 Routing

6.2.2.1 Layer 3 message Routing

- DPC routing to IP Add.

6.2.2.2 Gateway Screening

- For Front/End STP Functionality IF NEEDED.

6.2.3 Global title translation

6.2.3.1 ASG50 will forward global title translation query to a real STP (High)

6.2.3.2 Or, ASG50 will handle the query from it's own database (Low)

6.2.4 Maintenance Distribution

6.2.4.1 Crash of SSP

- Distribute Multi unicast Messages to inform all network.
- Other Maintenance support

6.2.5 Protocol between ASGs

6.2.5.1 ISUP over IP

6.2.5.2 SCCP and TCAP over IP

6.2.5.3 MTP2 functionality over IP

6.2.6 TFO support

Airslide gateway should support TFO call. The originating gateway should performer the standard 'TFO negotiation' with its mate MSC in order to signal it to send the voice in a compressed manner. The Media gateway should transport the TFO compressed framers on the RTP/RTCP layers. There is no standard of doing that therefore one should be created by Airslide and should be submitted as an RFP to the IEFT.
The terminating gateway should also perform a 'TFO negotiation' in order to signal to the terminating MSC that they both will use compressed framers on the 64kbits timeslot between them.
If the originating MSC is not supporting TFO and the terminating MSC does, then the originating gateway will get a PCM voice from the MSC and will compressed it. The terminating gateway will pass thru the compressed frames to the terminating MSC (according to the TFO standard).
If the terminating MSC is not supporting TFO and the originating MSC does, then the originating gateway will extract the TFO compressed frame that coming from the 64kbits , packetize it and will send it to the terminating gateway. The terminating gateway will decompress the TFO frames and will transmit it as a regular PCM.

6.3 Supported Network I/f

6.3.1 PSTN I/F

- E1/T1 75-120Ohm from 2 to 10 in a system
- V.35 for other SCP connection?
- RS449 (do we need it ?)
- DACS functionality for channelized SS#7 TS - LOW

6.3.2 IP Network I/F

- IEEE 802.3 10/100BaseT

6.3.3 Clock Synchronization

- Recovered from incoming Trunks
- Internal clock

6.4 System Performance

6.4.1 Call setup time

6.4.2 BHCA

6.4.3 Number of SS7 timeslots (DS0)

Each timeslot supports a maximum number of 30 call/sec (100% capacity).
DS0 should never support more than 80% capacity -> 24call/sec
Assume 4000 simultaneous calls on each MSC.
Assume 80 sec call length
So, 4000/80 = 50 call/sec (50*60*60=180,000 BHCA)
50 call/sec requires three DS0 in one link
Note that each link set is at least two links that are load sharing each other. Most of the time, each DS0 makes only 40% of it's capacity.

Each signaling link should support between 1 to 3 timeslots.
And should be scalable to 6, in case SMS will take 50% of system traffic (in the future)

According to TEKELEC:

Each 11000 users require 1 Link for SSP
Every 31 queries/sec to SCP require 1 Link (at 0.4 Erlang and 90 octet queries)

6.4.3.1 Transaction Per Second

6.4.3.2 Messages Latency

6.5 Fault Condition Handling

6.5.1 IP Network Side

6.5.1.1 IP Network Connection

6.5.1.2 Remote Nodes Failure

6.5.1.3 Consecutive Actions

6.5.2 PSTN Network Side

6.5.2.1 Layer 1 Failures

6.5.2.2 Layer 2 Failures

6.5.2.3 Consecutive Actions

6.5.3 Terminal Internal Failure

6.5.3.1 Consecutive Actions

6.5.4 Alarm Handling Priority & Display

6.6 Availability

6.6.1 Hot Stand by architecture

- Active Standby Synchronization

6.6.2 Switch time of XXX sec

6.6.3 Ongoing calls not affected !!

6.6.4 99.999% running time

6.7 Standard Compliance

6.7.1 SS#7

6.7.1.1 ANSI

Bellcore GR-246-CORE:

- T1.111.1 Functional Description of the MTP
- T1.111.2 Signaling Data Link
- T1.111.3 Signaling Link
- T1.111.4 Signaling Network Functions and Messages
- T1.111.5 Signaling Network Structure
- T1.111.6 MTP Signaling Performance

STP Generic Requirements GR-82-CORE

6.7.1.2 ITU-T

CCITT white book Q.700 Series

- Q.701 Functional Description of the MTP
- Q.702 Signaling Data Link
- Q.703 Signaling Link
- Q.704 SS#7 Network Functions and Messages
- Q.705 Signaling Network Structure
- Q.706 MTP Signaling Performance
- Q.711 SCCP Functional Description
- Q.712 Definition & Function of SCCP Messages
- Q.713, 714, 716, SCCP Format, Procedures and Performance
- Q.728 MTP2 Test Specification

6.7.1.3 Country Flavors

To Be Added

6.8 Management

6.8.1 Status Monitor

6.8.1.1 Network Connection Level

6.8.1.2 Equipment Level

6.8.2 Configuration Editor

Tables on the system:

- OPC to IP
- Global title translation table

For each table the following should be decided

- Method of update – management tool
- Static and dynamic update

6.8.3 Remote S/W Update

Non Traffic affecting

6.8.4 Statistics Reports

- Statistical tool for collecting data on calls, roaming, SMS and others for provisioning

6.8.5 Standard MIB

6.9 Security

The backbone is shared with the GPRS/CDPD users, therefore the system should not response to any terminal that is not authorized

6.10 QoS

Packets between ASGs should be prioritize as following

1. Voice packets
2. Signaling packets
3. Data packets

The prioritization tagging should be according to the standard the routers support ? (what is that standard) (who is supporting it) (depends on our partners because the tagging can be proprietary)

6.11 Scalability

6.11.1 E1/T1 Level

2 to 10 E1/T1

6.11.2 SS#7 TS Level

2 to 20 TS

6.11.3 SW Upgrades

6.12 Backward compatibility

6.12.1 To SW & Configuration

6.12.2 To IP Protocol

6.12.3 To Internal Stand by Protocol

6.13 Documentation

6.13.1 General description

6.13.2 Installation manual

6.13.3 User manual

6.14 Licensing

6.14.1 Per port ?

6.14.2 Per max ongoing calls

6.15 Compliance requirement

6.15.1 NEBS

6.15.2 CE

6.15.3 ETSI

6.16 Maintainability & Testability

6.16.1 B.I.T

6.16.2 Redundancy

6.16.3 Reliability (switch time)

6.16.4 Maintainability

- PSTN Interface Loop Back
- Internal Modem for remote support

6.17 Monitoring capabilities (TTI like)

A joint venture with TTI might add valuable edge to this product.

6.18 Added value services

6.18.1 SMS services

Airslide will provide (free of charge ?) a DLL for Windows (or other OS). Using this DLL, new WAP and/or SMS services can be easily develop without the need to understand SS7 complexity.
The DLL will execute all lower level of SS7 protocol (NIC/MTP3/SCCP/IS41/SMS)

6.18.2 Hardcore IN developer (i.e. HLR, WIN, VoiceMail)

Provide a driver that will be placed, transparently, in OMNI/Compaq/Trillium stack, and enables them to work without a real SS7 H/w.

6.19 Addition features for ASG1000

6.19.1 Context support for call control

6.19.2 ISUP monitoring

6.19.3 IS41/MAP monitoring

6.19.4 Port selection (map CIC to IP,Port)

6.19.5 CIC manipulation

6.19.6 Media gateway control

6.19.6.1 MEGACO ?

- Layer 3 Monitoring and Call Control Handling (GSM)
- IS41 Monitoring and Call Control Handling (CDMA)

6.19.6.2 MGCP ?

6.19.6.3 Q2931 ? (ATM ?)

6.20 HW Platform

Telco Platform !!

7. CASE STUDY

8. OPEN ITEMS AND NOTES

- *Use only private LANs for all OMNI network traffic.* For the private LANs, use the 192.168.0.0 C class network addresses which are reserved for private LANs by Internet Engineering Task Force (IETF). Use the *third* octet to identify the LAN, and the *fourth* octet to identify the CE. ***Use the same network address scheme for all OMNI clusters.*** The same private addresses for private LANs can be used by different OMNI clusters, even if all the clusters are attached to the same corporate network.
- How many MSC's exists in a standard network (from 6 to 20?,)
- What is the physical connection in a given network (E1, SDH etc.)
- What will be better to the operator (in terms of configuration change) : two link sets with one E1 for each link set or one link set with two E1s. It seems that one link set will be easier to support because of SCCP, connection oriented, messages that should travel on the same link sets for all messages in one transaction.

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MSU Handling - ASG1000

MTP3 Message Handling System Requirements Specification Document for ASG1000

'Airslide – Convergence Is a Fact!!'

Revision No.: 1.1
Released:30/1/00
Author: Ofer Gottfried
Document name: MSU Handling

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VERSION HISTORY

Version	Date	Owner	Change History
		Ofer	

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1. INTRODUCTION

poipoij

1.1 Scope and Purpose of This Document

This document describes the Technical Specification necessary for the system and software design of the ASG1000™ carrier class product line.

Ref. 2 provides the general system requirements for this document. The document is the basis to the project design; in some cases other documents provide more detailed description of the system requirements.

1.2 Definitions, Acronyms and Abbreviations

Name	Definition
ASG	Airslide Gateway
MSU	Message Unit
FISU	Fill In Signal Unit
LSSU	Link Status Signal Unit
LI	Length Indicator
SIO	Service information Octet
SIF	Signaling Information Field
PLAN	Private LAN
PC	Point Code

1.3 References and bibliography

Ref. No.	Document Name	Number	Version	Date	Location
1	MRD ASG1000.doc				
2	SySRS ASG1000.doc				
3	HW Requirements Doc				

2. SYSTEM BLOCKKS

The full ASG System Blocks are:

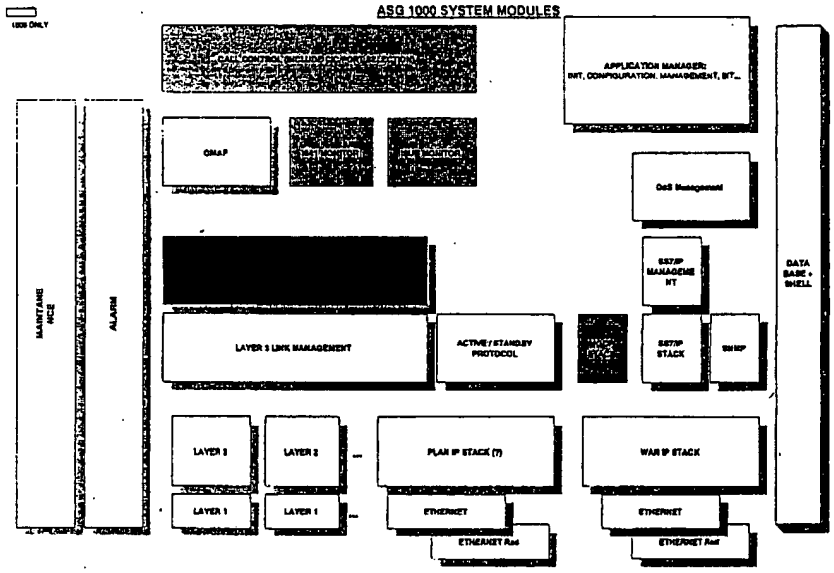

Figure 1: Full ASG System Blocks

This document describe in details the red block.

2.1 MTP3 Message Handling

2.1.1 General

- This block will handle two whey stream of MTP3 messages: Incoming and Outgoing. Incoming from the WAN (other ASG's) to the local SS#7 entity (or entities) and Outgoing from the local entities to the WAN.

2.1.2 Outgoing Path

- Upon receiving a valid MTP3 Message from local Layer 2 (booth live and standby links) it will be analyzed and rerouted to the next appropriate block according to the next principals:

"The Distribution is determined by the values in the NI and SI fields in the SIO"

Check the message type according to SIO field and route it according to the next table:

Service Indication Code	MTP Type	Route To	Remarks	
0000	SNM	OMAP	?	
0001	SNT	OMAP	?	
0010	Spare			
0011	SCCP	SS7/IP Manager	For CDMA networks send to IS41 only	
0100	TUP	?	?	
0101	ISUP	ISUP Monitor	For ASG50 only to SS7/IP	
0110	DUP1	?	Call and Circuit Related Messages	
0111	DUP2	?	Facility Registration and Cancellation	
Other		SS7/IP Manager		

Check if Sub Service Field in the SIO should be considered????????

According to the SIF field in the MSU (and maybe the Sub Service Field in the SIO) the DPC will be extracted and the routing on the SS7/IP will be done:

The first 14 (CCITT) or 24 (ANSI) bits in the SIF are the DPC of this message.

According to a PC to IP address table the SS7/IP Manager will send the message to the remote ASG.

This table can have around 20 entries and each IP address can have few PC's behind him.

When we cannot route an MSU to the desired DPC (K.A problem or not in the table) the MSU is declined and TFP is sent to the SP.

This procedure should take no more then 20Msec in (from MSC) and out (to the IP).

2.1.3 Incoming Path

- Upon receiving a valid MTP3 Message from the WAN (through the SS7/IP) it will be sent directly to the Layer 3 Message Discriminator. The DPC will be extracted and the message will be sent to the appropriate SS#7 Link set according to SS#7 entity that this link set supports.
- The Layer 3 Link Management will handle the loud balancing and the Alarm handling of links and link sets.
- Messages with the same NI,SLC and DPC will be routed over the same signaling link set. This is not applied to SNM, SNM MSU.

2.1.4 Statistics & Monitoring

This block will report all direction messages to a Statistic & Monitoring block for display and debugging!!

2.1.5 Provocative design

In the Outgoing path Upon receiving PC that is not in the table it will be sent according to a default IP address that of the ASG that is connected to the STP !!

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Airslide Business Plan

IP Convergence and Enhanced Services for Cellular Backbones

"The MSC market is likely to remain highly volatile but permanently hungry for meaningful local technology. Most markets are still largely unstandardized, too many countries and cultures are involved. The MSC company that spots the niche and sets the standard will get the money that owns that market."

Techsight.com

Revision No.: 1.2
Released: 1/2/00
Author: Stephan Ouaknine
Document name: Airslide Business Plan

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1. MISSION STATEMENT

Airslide Systems intends to streamline a young and unstandardized Cellular Infrastructure industry by becoming a world leader in IP-based convergence solutions for Cellular Network Backbones.

2. PATENT INTRODUCTION

The following documents will demonstrate Airslide Systems Intellectual Property from several perspectives. While Airslide's technology is only in the beginning stages of development measures have been taken by Airslide Management to run R&D as any large corporation would, using standard documentation. Attached, are a Business Plan, a System Design document (SRS), an Alarm Control document, a Marketing Requirements document MRD) and an MSU Handling document. Each document separate aspects of the total revolutionary Airslide Solution for IP Convergence for Cellular Network Backbones.

3. EXECUTIVE SUMMARY

Airslide is a young and dynamic company aiming to use tomorrow's technology to solve today's cellular networking problems. In as fast paced and infantile an industry as the cellular industry, there is bound to be a little bit of a mess. Wireless networks are dependent on wireline technologies. Today's Cellular Networks consist of three internal networks; one for Signaling, one for Voice and one for Data. No matter how you slice it, this topology is wasteful and costly to maintain.

Airslide Gateways provide the world's first cellular network converged platform. All three networks, signaling voice and data are merged into one lean, efficient, cost-effective IP network.

- *without waiting for 3G standards to emerge*
- *without replacing the entire network,*
- *without risking reliability,*

Cellular Networks can enjoy the advantages of convergence by installing Airslide Gateways to their Mobile Switching Centers (MSC's). Whether the MSC's transfer calls within one network or between two separate networks, Airslide's IP Converged Network

platform will enable seamless, Voice, Signaling and Data transfers bypassing all STP and PSTN switching.

3.1 Why Convergence

The Cellular Telecommunications industry is in the process of defining the next generation of cellular standards and technologies. This initiative, called 3G, has as its goal to achieve harmonization among the GSM, CDMA and TDMA standards. This process is progressing slowly due to countervailing interests. 3G is anticipated to be released by 2002 and implemented by 2004 whereby the infrastructure manufacturers will develop next generation cellular infrastructure equipment to replace the existing systems. The focus of 3G harmonization has been Access, particularly Radio Frequency (RF) Access. Network backbones will need to be replaced as well although there is little indication of exactly how or what will replace them.

Airslide meets today's demands for Converged Cellular Networks without replacing any of the infrastructure. When 3G standards become for defined, Airslide will be market ready, with a strong install base. Airslide will sell its convergence solutions to the major hardware manufacturers who will be looking to sell full 3G IP networks.

3.2 Saving Money

Cellular Networks transfer calls between MSCs through STP, Tandem and PSTN switches. These are generally owned by the local Phone Company. This cost is divided in three; the sending line, the transfer fee and the receiving line. Airslide Gateway eliminates the transfer fee and optimizes the Voice, Signaling and Data transfer over IP. This protocol translation creates a level playing field. Now, cellular networks can start sending all signaling, voice and data directly without costly arbitrage, leased line and transfer costs. Moreover, as subscriber rates increase, so does the need to expand network infrastructure. Adding MSCs, Data Networks such as CDPD and GPRS and STP and Tandem switches is very costly, as are their maintenance costs.

3.3 Making Money

Cellular Networks are looking for new revenue streams. Phones are virtually free, retail airtime is dropping in price and most people are not yet ready to hear McDonald's commercials interrupting calls. The "next big thing" is enhanced data services. Each cellular standard boasts that it offers the most advanced and innovative services on the market. The Airslide solution provides added value from a different angle. *IP Based Enhanced Data Services*. thus providing a new revenue stream to cellular providers. Airslide's target market is Cellular Operators. Particularly those in markets where the cost of Cellular and more generally Telephony infrastructure are high. By enabling new IP Based enhanced data services, Airslide not only saves operators 40% of their operational costs, but enables them to add lucrative new services to their product offering. Corporate enterprise market share is a key success factor for most cellular

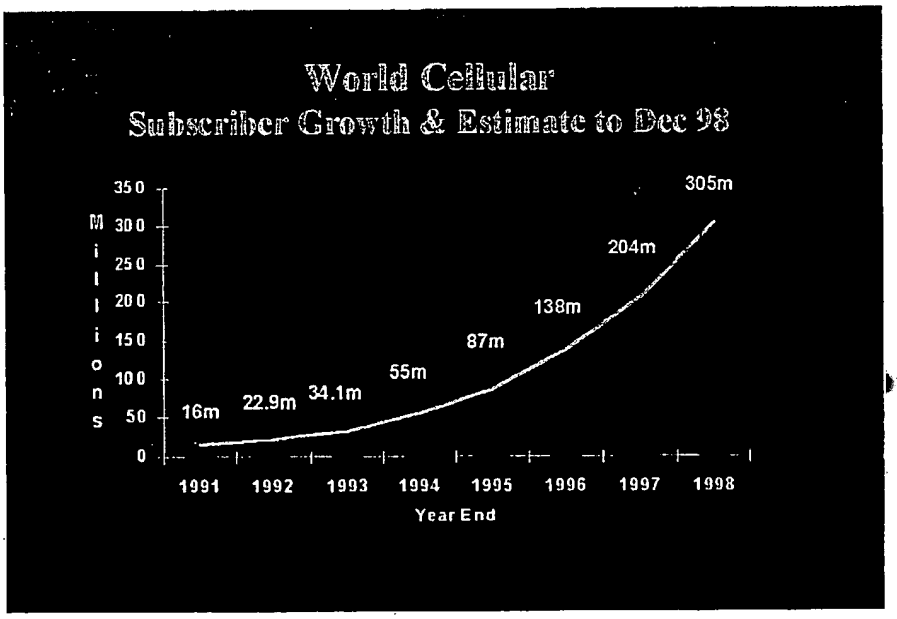
providers. By transforming it's backbone to IP, providers can seamlessly enable it's enterprise customers to offer remote access to their Intranets via Private Access Extranets, as opposed to the public, less secure, bandwidth conscious World Wide Web. Practically this means that Oracle VP Sales can access his Intranet from a remote location from his mobile handset and plan a sales meeting with 6 account managers and dynamically update their schedules. Airslide is developing DLLs which will reside on the Corporate version of the Airslide Gateway which enable Cellular providers to resell a host of Airslide Enhanced Data Services or develop their own customized applications.

4. MARKET ANALYSIS

Airslide's market can be determined by examining various elements of the telecommunications industry. In order to accurately define the market for Airslide's products, its staggering growth rate and the market share that Airslide can expect, we looked at the following market segments:

4.1 Cellular Subscribers

There are currently 305 million cellular subscribers worldwide and 900 million wireline subscribers worldwide. Growth trends indicate that while wireline markets are in a mature cycle, wireless numbers will increase exponentially in the next 5 years. By 2005 there will be over 1 billion cellular subscribers worldwide. A figure that is anticipated to surpass that of the wireline total.



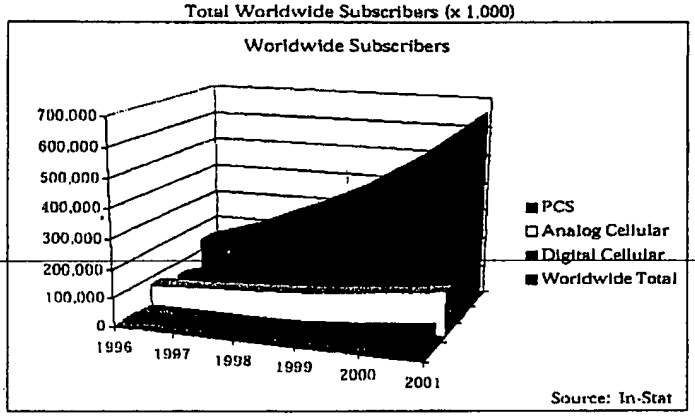
Regionally cellular expansion has done well in European markets where wireline rates are higher while an ever-expanding network of roaming partners in the Americas has created the worlds largest cellular market at 157 million subscribers by 2001.

Worldwide Wireless Subscribers (x 1,000)

U.S.	44,043	54,613	64,444	75,399	85,955	95,410	14.97%
Canada	3,358	4,353	5,441	6,529	7,704	8,821	19.31%
South America	6,824	11,542	17,890	26,299	37,870	53,018	46.40%
The Americas	54,225	70,508	87,775	108,227	131,529	157,250	22.20%
Western Europe	35,333	49,770	65,037	78,347	90,503	100,458	19.19%
Eastern Europe	1,320	3,115	7,164	8,776	10,531	12,374	41.18%
Russia	225	516	903	1,536	2,457	3,685	63.46%
Subtotal Europe	36,878	53,401	73,104	88,658	103,491	116,517	21.54%
Japan	23,105	35,428	49,599	65,471	84,458	106,416	31.65%
ROW	27,582	47,838	76,541	120,170	185,061	279,442	55.46%
Worldwide Total	141,790	207,175	287,019	382,526	504,539	659,626	33.58%

Source: In-Stat

The following two illustrations demonstrate how GSM is the prevalent cellular standard and how digital networks are making substantial gains over analogue (AMPS) networks. This trend towards digital cellular networking makes hardware manufacturers of digital WAN and switching equipment ideal partners for Airslide and thus in the next section we will list the market leaders in this industry.



Total Worldwide Subscribers (x 1,000)

Worldwide							
Analog - 800	62,483	75,100	85,780	100,183	121,065	142,345	17.33%
Analog - 900	13,739	11,514	10,790	10,399	11,027	12,473	2.02%
CDMA - 800	334	3,750	9,209	19,304	33,780	62,405	101.98%
TDMA - 800	1,438	2,889	4,047	6,870	10,659	15,126	51.27%
GSM - 900	37,640	68,754	105,745	147,224	194,152	250,047	38.10%
DCS-1800	1,971	4,564	6,858	8,989	13,360	17,229	39.39%
CDMA -1900	73	2,016	6,171	8,406	13,052	20,752	79.12%
TDMA - 1900	9	775	2,233	4,587	6,008	8,191	80.30%
PCS - 1900	998	2,385	6,587	11,093	16,978	24,640	79.28%
PDC Total	18,168	28,312	40,637	55,640	73,777	94,960	35.33%
PHS Total	4,937	7,116	8,962	9,830	10,680	11,455	12.64%
Analog Total	76,221	86,614	96,570	110,583	132,092	154,818	15.63%
Cell. Dig. Total	39,413	75,392	119,002	173,398	238,591	327,578	44.38%
PCS Dig. Total	3,051	9,740	21,849	33,075	49,398	70,813	64.20%
Worldwide	141,790	207,175	287,019	382,525	504,537	659,624	33.58%

Source: In-Stat

4.2 Voice versus data

Today, data traffic makes up only about 3 percent of wireless network traffic (Lucent) but that soon will change. Wireless data is expected to comprise more than a quarter of network traffic within four years according to Nortel Data.

With the advent of Wireless Application Protocol (WAP) and 3G next generation wireless, data will occupy a 60% larger piece of the wireless telecom pie by 2001. Companies such as Unwired Planet are currently developing browsers for cell phones based on HDML and HDTP technologies and CNN is promoting a data service for cell phones. It thus important that Airslide be fully 3G and WAP compatible in order to benefit from the anticipated rise in data traffic. Although the full force of 3G is still a couple of years away, companies such as Lucent have a thriving wireless business today. In fact, they won more than $2.5 billion in wireless contracts in 1998, and saw their wireless business grow faster than any other market segment.

4.3 The Players

This segment can be divided into two categories. Both leading MSC and Switching Systems manufacturers as well as leading cellular service providers are relevant to Airslide. We intend to OEM and License our System through the hardware vendors but must remain in close contact with the end user, being the cellcos.

The top Cellular MSC and Switching System developers are:

- Ericsson
- Lucent
- Motorola
- Nortel Networks
- Nokia
- Alcatel

While there is a debate as to whether Nortel, Alcatel or Lucent hold the most market share, what is clear is that they have each had extremely strong fiscal results, primarily in their respective wireless infrastructure divisions. Alcatel's 1998 revenues were 25 billion USD, 45% of which derived from wireless infrastructure totaling 11.25 billion USD. Nortel posted 1998 revenues of 17.8 billion. IDC estimated Nortel Networks' share of the 1997 global WAN ATM and frame relay switch market at 19.5 percent. IDC also projected that market to grow more than 160 percent by 2002, from 18 billion in 1997.

The following is a list of the leading cellular service providers:

- Airtouch
- Vodaphone
- Bell Atlantic Mobile
- GTE Wireless
- France Telecom Mobile
- Deutche Telecom Mobile
- Telecom Italia Mobile

In total there are 539 cellular service providers worldwide and as WTO deregulatory initiatives such as the 1998 Fourth Protocol of Telecommunications continues, governments are auctioning off new licenses and the number of cellular providers is expected to double by 2003.

The largest provider is Airtouch Communications. They ended Q4 98' with more than 44 million customers, making Airtouch the world's largest wireless phone company. Quarterly revenues exceeded $2.1 billion, up 27 percent over the previous quarter. Airtouch owns and operates cellular networks in 13 countries on 4 continents.

4.4 Traffic

Telephony is a 650 billion USD annual service business worldwide, 180 billion USD in the US alone. About 170 million telephone lines exist nationwide, including businesses. (Cisco research). The cellular telephony market in 1999 comprises 30% of the total telephony service market at 195 billion USD worldwide, system-wide. That figure is expected to increase 300% to over 600 billion USD by 2005 as cellular and wireless communications replace existing wireline systems.

Vodafone, a UK cellular service provider transfers 500 Million minutes per month from their cellular network to other cellular networks through the topology of the PSTN transfer. They pay 3 pennies per minute. Vodafone's average annual PSTN expense is nearly 400 Million USD and this number is anticipated to reach 1 billion USD by 2003. This is part of the expense that the Airslide solution helps companies save by acting as a gateway protocol conversion system directly between two cellular networks.

5. COMPETITION

Time To Market, Baby!

True convergence of Voice, Data and Signaling to Pure IP for Cellular Network Backbones. Today's niche, tomorrow's really big success. Three words baby, Time To Market. The market is moving in our direction to be sure. Airslide possesses a 1-year lead-time on any potential competition...that we know about. Research shows, no full solution such as Airslide's exists in today's marketplace. Nevertheless, partial solutions do exist and can represent considerable competition. These solutions can be divided into two categories; 800-pound gorillas and small to midsize companies. While the beast defines general directions and has recently demonstrated a willingness to promote convergence and IP, the small to midsize, are chipping away with more innovative solutions...until the gorillas acquire them, of course.

5.1 800 Pounds Gorillas

Nestled deep in the forests of corporate America can be found such distinctive players as Nortel Networks, Lucent, Ericsson, Alcatel (OK France) and Motorola. They provide the bulk of network equipment to cellular operators, some of which is proprietary and much of which is acquired or OEM. Nortel is developing a product called Passport, which provides convergence of only voice and data, for fixed wire-line networks, and over ATM. They only anticipate a Cellular product in 2 years time and in 3 years they may

have made the transition to IP from ATM. Full convergence of voice, data and signaling will have to wait until 3G standards, particularly for backbones are determined and even the most optimistic analysts say that will only be in 2004. Lucent provides a similar system and similar timelines. Most notably, these are centralized technologies whereas Airslide's network coverage is dispersed, rendering the solution far more cost effective. The amount of traffic that these singular ATM Convergence Gateways must support and the amount of bandwidth required makes them exponentially more expensive than Airslide Gateways even when fully deployed.

Motorola, Ericsson and Alcatel are placing more of their focus on access solutions rather than backbones. Ericsson is aggressively taking the lead on such cutting edge technologies as WCDMA and GPRS whereas Motorola is emphasizing their advanced WAP handset technologies.

5.2 Small to Midsize

These are the companies to pay close attention to. Various partial solutions are appearing in the marketplace. Tekelec has developed an SS7 to IP Stack called "The Power of 7" which they intend to sell to solutions providers who may or may not attempt to build an Airslide type of Gateway. When asked at the Telecom 99' show in Geneva, when they will be coming out with a product for the cellular market they claimed they had no concrete plans to do so. Tekelec recently acquired IEX, a company which develops a Media Gateway solution, called the Davincy Line, which packetizes voice traffic. IEX engineers revealed that they too know nothing of a cellular product timeline and more importantly expect Tekelec's products and IEX's products to remain separate. Nevertheless, Tekelec remains their closest potential competitor.

There are other developers of Media Gateway, MGCP and Megaco solutions such as Salix and Magellan but they specialize in Voice and Data, and show no movement towards full convergence over cellular backbones.

Three Words...Time To Market. We have at least a one-year lead-time. With a large enough install base and some market awareness, Airslide Systems will be well positioned as a world leader in True Convergence Solutions over IP for cellular networks.

02-10-00

Approv

jc658 U.S. PTO
02/08/00

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PTO/SB/16 (2-98)
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This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

jc541 U.S. PTO
60/181097
02/08/00

INVENTOR(S)		
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[x] Additional inventors are being named on the 1 separately numbered sheets attached hereto

TITLE OF THE INVENTION (280 characters max)

AIRSLIDE SYSTEMS IP CONVERGENCE GATEWAY

Direct all correspondence to: CORRESPONDENCE ADDRESS

[ ] Customer Number → Type Customer Number here

Place Customer Number Bar Code Label here

OR

[ ] Firm or Individual Name	ABELMAN FRAYNE & SCHWAB				
Address	Attorneys at Law				
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Country	U.S.A.	Telephone	(212)949-9022	Fax	(212)949-9190

ENCLOSED APPLICATION PARTS (check all that apply)

[x] Specification Number of Pages including drawings	79	[ ] Small Entity Statement	
[ ] Drawing(s) Number of Sheets		[ ] Other (specify)	

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)

		FILING FEE AMOUNT ($)
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

[x] No.

[ ] Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE Jay S. Cinamon Date 02/08/00

TYPED or PRINTED NAME Jay S. Cinamon REGISTRATION NO. (if appropriate) 24,156

TELEPHONE (212)949-9022 Docket Number: 204,396

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INVENTOR(S)/APPLICANT(S)		
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60181097.020800

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